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The Image as a Communication Tool for Virtual Museums. Narration and the Enjoyment of Cultural Heritage †

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Abstract: The challenge of contemporary museums is to make content accessible to a wider audience; in this way information related to the good becomes more communicative and usable in order to enhance its uniqueness. Accessibility goes through an innovative communication of content: the Information and Communication Technologies (ICT) that are increasingly part of people's daily lives. Communication in most cases occurs visually, so ICTs are increasingly focusing on a rethinking of this expressive form; images become a better support for high-quality data transfer.

Keywords: cultural heritage; virtual museum; ICT; virtual tour

1. The Museum Experience

In a conference held at the Guggenheim Museum in Bilbao on 25 June 2001, Umberto Eco opened his talk entitled "The Museum in the Third Millennium" with a critique and a citation: "We begin by speaking badly of museums, and we give the word to Paul Valery" [1] (p. 1290).

> *I don't like museums much. There are some admirable ones, but none is delightful. The idea of classification, conservation, and public utility, which are correct and clear, have little to do with delights…I find myself in a tumult of frozen creatures, each of which demands, without obtaining it, the inexistence of all the others… In the silence, a strange organized disorder spreads out before me. I am seized by a holy dread. My gait becomes religious. My voice changes, becoming a little higher as if I were in church, but softer than it is in life. Soon I no longer know what I came to do in this waxen solitude, redolent of the temple and the salon, the cemetery and the school… How tiring, I tell myself, how barbaric! All this is inhuman. It is not pure. This onset of independent and inimical marvels, and the more inimical the more they resemble one another, is paradoxical… The ear would not bear ten orchestras playing at once. The mind cannot follow many different operations; there is no simultaneous reasoning. But the eye… when it sees something, is forced to admit a portrait and a marina, a kitchen, and a triumph, people in the most diverse states and positions, and not only that, it should also gather harmonies and incomparable painting techniques all in the same glance… productions that devour each other… But our heritage is oppressive. Modern man, exhausted by the vastness of his technical means, is impoverished by its excessive richness… An excessive, and therefore unusable capital.*

In Paul Valery's text, written in 1923, Eco identifies three museum characteristics that can be synthesized as: (1) unfriendly environment, (2) lack of context, and (3) excessive number of works.

He states, "Today, the evolution of the museum means that Valery's first two objections are no longer valid: the museum has become bright, sunny, friendly, welcoming, cheerful, and the distribution of the rooms almost always favours the relationship between the work and its context. Have we remedied the third characteristic?"

We cannot help but agree with Eco that the institutional museum has tried to overcome the traditional 1700s encyclopaedic and taxonomic idea of ordering and classifying, which is first aimed essentially at the collector and only later at specialists. It has tried to overcome its past role as a container for conservation and exhibition directed at an increasingly diversified community, assuming the task of transmitting knowledge. To increasingly fulfil this goal, museums have opened their rooms to citizens by hosting conferences and concerts, to community initiatives, becoming an integral part of a collaborative network of museums, universities, public entities, private companies, and the community.

It cannot be denied, however, that the original nature of the museum, a container even with its ordered finds, provides the user with an excess of information that confuses and contrasts with the quality of the information itself.

Philippe Daverio [2], in his entertaining talk at a conference in Verona on 19 June 2012 entitled "The Spirit and Forms", played with the common root of the compound nouns *pinacoteca* [art gallery] and *paninoteca* [sandwich shop]. With these words, he expressed a clear concept that can be summarized thus: just as we do not enter a *paninoteca* wanting to taste all the sandwiches, we do not enter a library expecting to be given all of its books. And yet we enter a *pinacoteca* with the aim of seeing all of its works and we enter a museum with the aim of visiting all the rooms, convinced that this sort of informational bulimia can be retained and cemented in our memory.

Umberto Eco, again in his talk from the conference in Bilbao, says that whenever he is in Amsterdam he dedicates at least half an hour to visiting the Rijksmuseum for the umpteenth time in order to see a specific work of art housed there: a church by Pieter Jansz Saenredam. He recounts how he walks quickly and indifferently past the rooms dedicated to Rembrandt, ignoring them, led by the sole scope of reaching and admiring what for him is the only work worth the fatigue of doing so.

In his utopian conclusion to his Bilbao talk, Eco writes, "My ideal is a museum that serves to understand and enjoy a single painting (or a single statue, or even a single salt cellar by Cellini). Botticelli's *Primavera* is an example. The entire sequence of rooms in the Uffizi should be transformed into a single path through which one reaches the end with complete understanding of the *Primavera*" [3].

Now, the image of the museum that we draw from Philippe Daverio or from Eco's experience in Amsterdam is the museum as a container of works. The expert user, interested in refreshing knowledge of a group of works or a specific work—knowledge learned through cultural paths that are completely independent from the museum—is willing to undergo what is inevitably experienced as fatigue.

On the other hand, the utopian idea of the museum dedicated to a single work, based on its public and evident fame, can be valid precisely for Botticelli's *Primavera* as it is presented in any text on art or history for elementary school children. We are therefore faced with a display, a narration with the specific task of transmitting knowledge from the curator to the user according to a fundamentally unidirectional methodology. Minor works can only act as the backdrop for the major work, creating a dependence on it that could falsify its historical and social role.

Instead, it may happen that a frequent visitor to a museum, who, recalled by the need to see a specific work again, becomes pleasantly distracted by another, pausing on a work that had not been seen before or grasping in it things that the preceding and fleeting visits had overlooked. One suddenly experiences the astonishment of discovery; one then feels the motive and value of the place and how the work is intimately tied to the objects that environment gathers together. That traditional unidirectional relationship between the museum as a container of information and the user is suddenly broken and one becomes actively involved and participates in the cultural structure that is the museum.

2. The Value of the Signifier

As defined by the International Council of Museums (ICOM) [4], "the museum is a non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates, and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education, study, and enjoyment".

This declaration describes the museum as a cultural phenomenon that is transformed into an active entity with the scope of involving an increasingly broad public. The museum should transmit the necessary information for the user to easily understand both the individual work and the overall sense of the collected objects through a set of activities that aim to instruct different visitors in a fun, pleasant way. The organization of museum communication then becomes particularly important.

As Francesco Antinucci reminds us, communication is the act in which "someone communicates something to someone else: the two—someone and someone else—are crucial. Communication is the means of transferring knowledge, information (something) from someone who has it to someone who does not" [5] (p. 14).

It is clear that the "someone" who has the information can refer to the museum while "someone else" refers to the user. Now, while the museum's material of knowledge is known to be what is in its rooms, its archives, it is much more difficult to define the characteristics of the "someone else": users, their knowledge, sensibilities, and preparation. Therefore, the user is not an abstract entity referred to theoretically, but a specific identity with personal characteristics. As a consequence, there is a need for this identity to participate directly and actively in the system of information acquisition.

It is also important to show that so communication can happen, it should rest on a system, a shared code, to transmit the information. In the case of the museum, this shared transmission system is continuously changing. Learning by the user, due to the information proposed by the transmitter, the museum, allows the level of information contained in the communication to grow in quantity and quality. The transmitter and the user are intimately tied to the information, which changes as the communication evolves.

Using the words of Francesco Antinucci, "we recall that the sign is fundamentally and absolutely an 'intangible' object: its material half, the signifier, is a unit whose value resides exclusively in allowing itself to reach the signified. And correctly arriving at the signified—that is, what is intended by those that have created and transmitted the sign—is the ultimate and sole scope of the entire communicational process… If, then, the specific value of the signifier is to allow the signified to be reached correctly, it is evident that this 'tool' should be situated so that it can carry out its primary function and, in this scope, can not only intervene on the signifier, but should do so; it is obliged to do so out of respect for the work" [5] (p. 111).

If we substitute information and communication technologies (ICT) for signifier in Antinucci's text, the role that these technologies have in the system of communication is clear. Their value goes beyond their technical state to initiate an emotional relationship with the user that is necessary to construct the bridge required for communication, intended as the active, productive exchange between the user and the information.

Museums increasingly try to overcome their original mission of the unidirectional communication of knowledge to follow the revolutionary road of bidirectional communication, where the user's active participation implies an expression of interest that acts directly and indirectly to manage the tangible and intangible heritage that the museum interprets.

3. Virtual Museum

The museum is therefore understood to be a place for interaction, where its intrinsic nature of cultural exchange is realized. The information is not only proposed to the user, but the user's behaviour towards the information becomes the motive for interacting with the data, proposing a system of iterations that are structurally recursive but constantly modified according to the user's actions.

The physical limitation of spaces, together with the fragile material concreteness of the artefacts, can be overcome by its transformation into data that can be interpreted in different ways and which

are appropriate for realizing the transfer of bidirectional, dialoguing information between the transmitter and user; the museum becomes virtual.

We are the first to consider that the virtual museum cannot and should not substitute the physical museum. The experience of a visit to the Uffizi Gallery, the British Museum, the Metropolitan Museum of Art in New York, the Vatican Museums is absolutely irreplaceable, because everything contributes to the experience, from finding oneself in front of a work by a great master to the presence of users from every nation who comment in admiration, from the overwhelming beauty of the places where these works are housed to the bookshops and cafeterias where one waits to buy a bottle of water. But the informational character, the possibility of being able to experience works that cannot be reached easily through an easily accessible virtual museum, can in part contribute to collective culture.

Experiments with ICT to identify the tools most appropriate for communicating complex informational realities hold particular value. The Department of History, Design, and Restoration of Architecture in Rome has for many years been interested in these systems of information transfer, carrying out experimentation that is concretized in research, doctoral theses, and not least, the Master in Communication of Cultural Heritage.

Some experiences are oriented at reconstructing navigable virtual models, in both 3D and immersive modes. Of particular interest are experiments on the reconstruction of architectural complexes that no longer exist or diachronic urban spaces that have characterized the history of specific urban places. Real constructed buildings coexist with buildings destroyed by wartime events or with buildings that were designed but never realized. The complete freedom of movement allows for the use of iterative tools aimed at total immersion in the created images.

In other experiences, the virtual space is understood in its digital essence. Space is the result of the parameters characterizing the individual works together with parameters of proximity and distribution related to the user's choices. Since there is no gravity, space can be visited through unconventional physics, following, in all directions, the changing expository aggregations that are constantly self-determined. Immersive tools allow for participation in the conditions proposed by the changeable models of museum.

4. MUVAT. The Virtual Museum of the Tronto Valley

The MUVAT project originated as a virtual museum for the areas of the high Tronto valley. This is a largely anthropized area, with a heritage of tangible and intangible goods distributed throughout, a social fabric rich in tradition, costumes, and a fragmented but high-quality economic life related to food and agriculture and manufacturing.

The museum was therefore created with the aim of systematizing this heritage to acquire, conserve, and protect it, pursuing the aim of studying, displaying, and communicating it, and also systematizing the communicational experiences carried out over the years.

The design of a virtual museum must begin with the problem of fruition. The interests of an expert or technician are different from people visiting the museum for the first time and should therefore be guided in the discovery of the heritage contained in it. Triggering an active relationship with the social and complex reality of the territory is fundamental. It is likewise important to evaluate the interest of the user in the entire museum structure, the works, and the exhibits that are displayed so that communication can be adapted, followed, and directed for greater satisfaction and enjoyment.

Let's take an example with a traditional museum, figuring that these different uses and users are associated identifiable physical locations. We can say that the place of experts is the spaces for cataloguing, the rooms where the material is stored, the library, the conference rooms where the displays and communicational, educational, and reception strategies are determined. Then there are the exhibit rooms, which are set up differently by different curators and specialists. The places where the community socializes are not only the auditorium where the public participates in conferences and particular events, but also the courtyard where users exchange their own impressions and can meet with experts to ask particular questions about what they have experienced at the museum. Since

our museum is virtual, we understand these "places" to be entirely permeable and interconnected, and they can partially overlap.

Three places were therefore identified within the virtual museum, characterized by different systems of communication that are tightly interconnected even if distinct from the different means of interacting with them: the expert, the exhibit, the community.

The MUVAT project is therefore presented with a simple screen on which there are three main entrances to the system: expert, exhibit, and community (Figure 1).

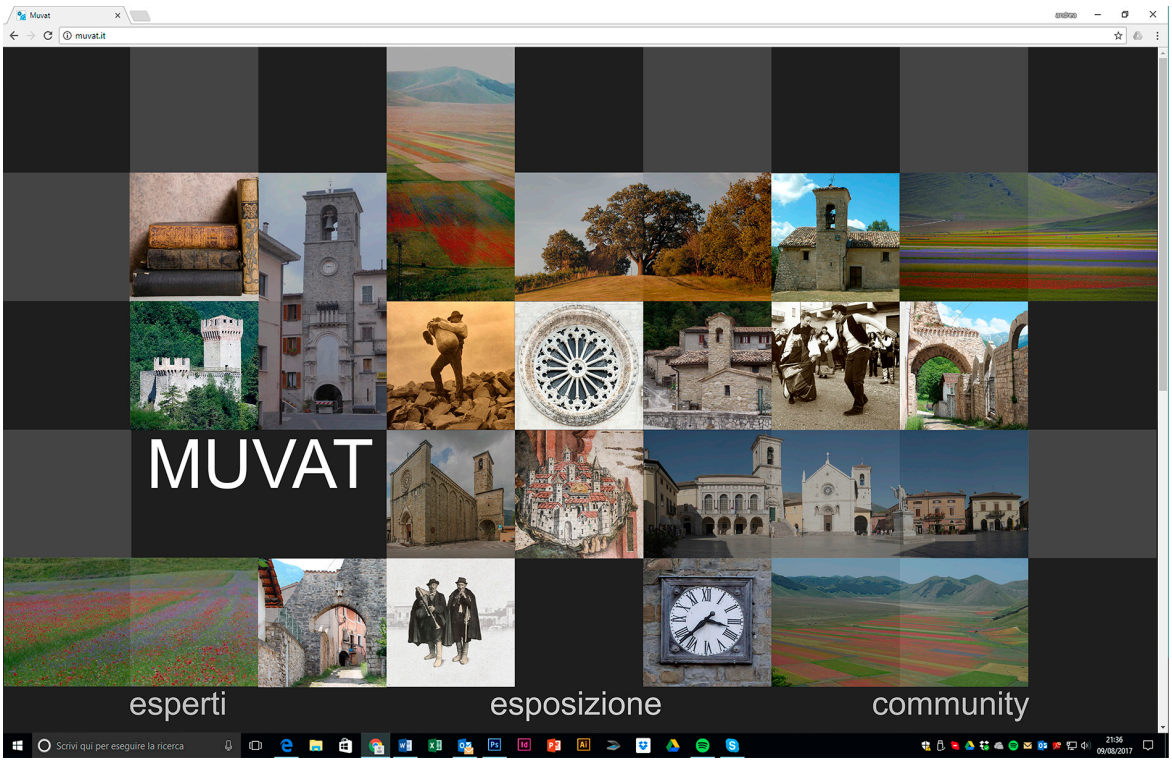


Figure 1. The home page of the MUVAT portal, where you can choose the type of navigation within the website: experts, exhibitions, communities.

Expert. This user is interested in finding specific information in the system as quickly as possible. The expert is the main person responsible for managing the information within the expository system. The expert's task is not only to access databases, but to enrich it with information, also performing data quality control and participating in the bidirectional communication process proposed by the museum. The main relationship of the expert with the informational system is the database. An entrance control procedure (login) limits access to recognized experts to allow them to intervene on the data; the search for information within the system is open to everyone.

Exhibit. Non-expert users should be accompanied through the museum with different narrations, acquiring information according to their own attitudes, interests, and cultural preparation; the device therefore initiates the user's active participation in acquiring information.

Community. It is necessary to understand a recognizable group of people united by common interest in the territory and museum, either individuals or people organized in any type of social structure. The interface with the user is comparable to an online newspaper with a broad social segment dedicated to sharing and exchanging information and experiences. The scope of the community is twofold: on the one hand, it informs all the activities and initiatives that are seen in the territory; on the other hand, it is a valid system to measure the success of the initiatives proposed through the blog. The scope of the community space is to inform users of the matters that occur, and also to make them promoters of information, enriching the system with their own sensibility and culture.

In particular, the project has developed the expository part with particular attention to the way of obtaining the iteration in managing the information and therefore the virtual space of the interface, and not least, the emotional characterization with it.

In view of the heterogeneity of the information and the different personalities that participate in it, the MUVAT project proposes different means of navigation corresponding to different narrations: narration on the artistic heritage, the richness of the territorial landscape, traditions, music, etc.

Countless narrations are available to follow the user's countless interests. But in order for the acquisition of information to be effective and actively involve the user, it is necessary that the user be able to experiment with different instructional itineraries, thereby piquing the user's curiosity for new paths of knowledge.

The theoretical scheme is therefore a series of characteristic, differentiated narrations that can be chosen by the user, but the user is given the possibility of abandoning the narration at regular intervals in order to access new informational paths (Figure 2). The narrations are therefore equipped with a series of nodes, i.e., intersection points that place the user in front of the choice. Choosing a narration, one enters the first room, and once this has been crossed, the user is confronted with two doors. The first leads to the room that further expands upon the chosen theme. The second proposes an alternative narrative path.

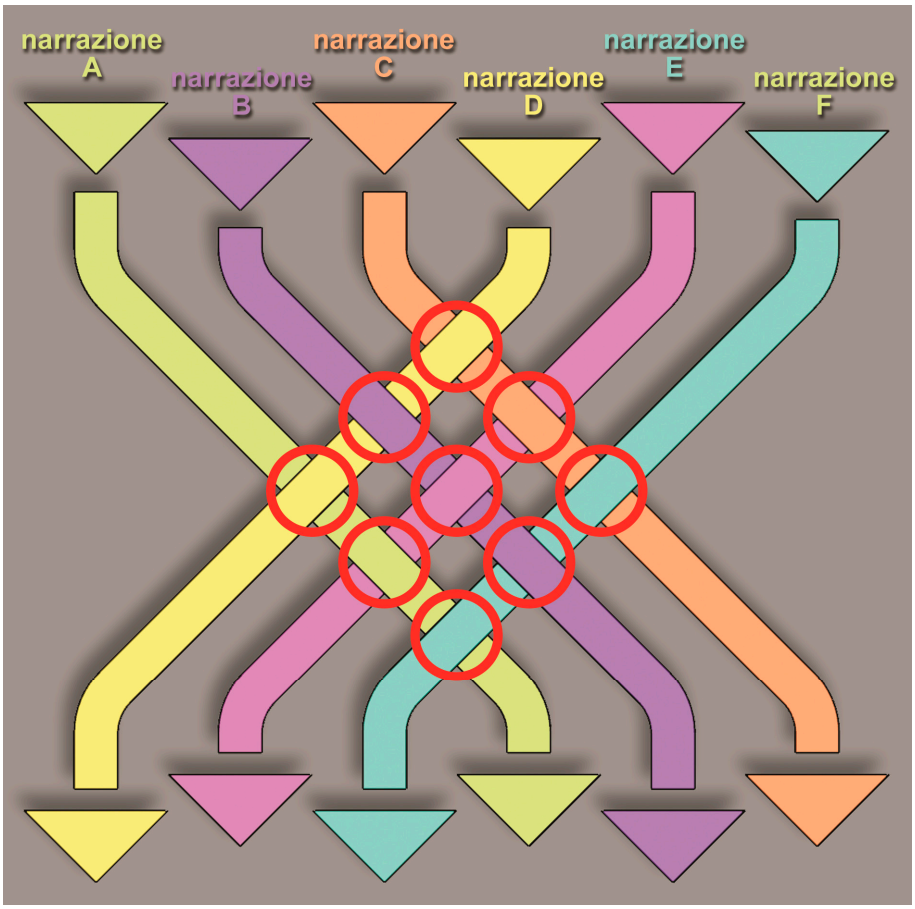


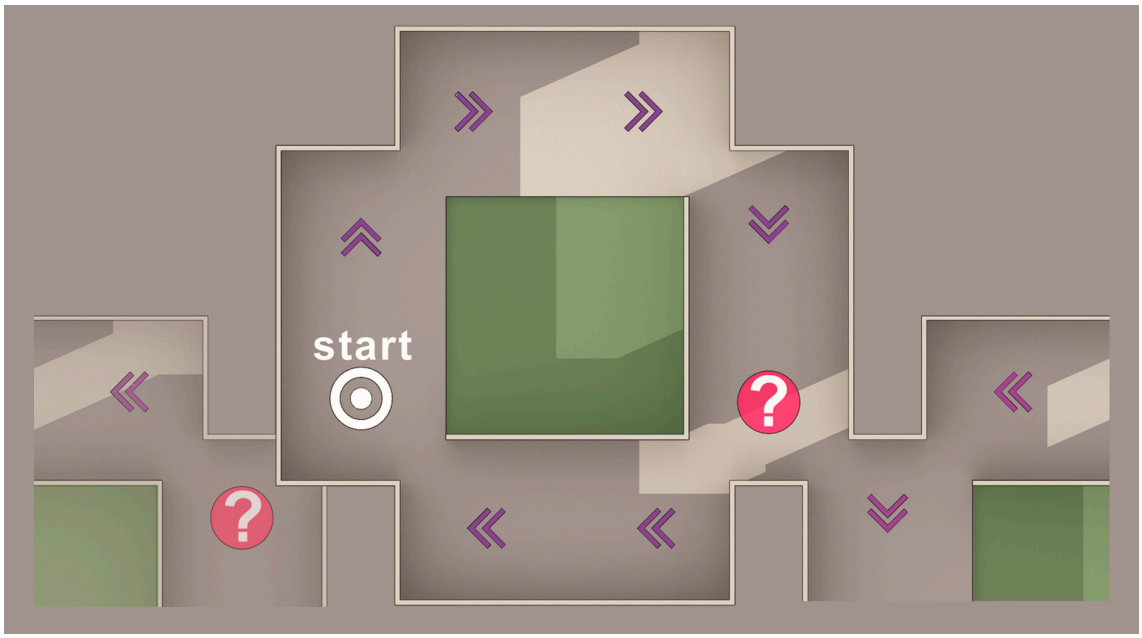
Figure 2. The diagram shows the possible relationships between the different narrations contemplated in the MUVAT site. The result is a portal with ever-changing content.

The graphical scheme demonstrates only part of what happens. In the ICT model, we can easily understand that the possible intersections with the other narrations are completely random. The other narrations are presented randomly, interacting with the user's curiosity to constantly renew the museum.

The role of the expert curator is essential in managing and promoting the information. This person should organize the data according to a hierarchically determined structure of learning that succeeds in deepening the information as subsequent rooms are crossed.

The virtual space. The museum system establishes an unlimited number of possible narrations, so the expository space is determined by rooms that are architecturally identical, but with different exhibits.

As can be seen in the image (Figure 3a), the exposition room has the shape of a Greek cross; it is wide and delimited by walls, enriched with a patio in the centre. The entrances/exits that connect the room with the one before and the one after are placed symmetrically with respect to the vertical axis. The rooms, which are all the same, follow each other, alternating and mirroring each other about the horizontal axis.



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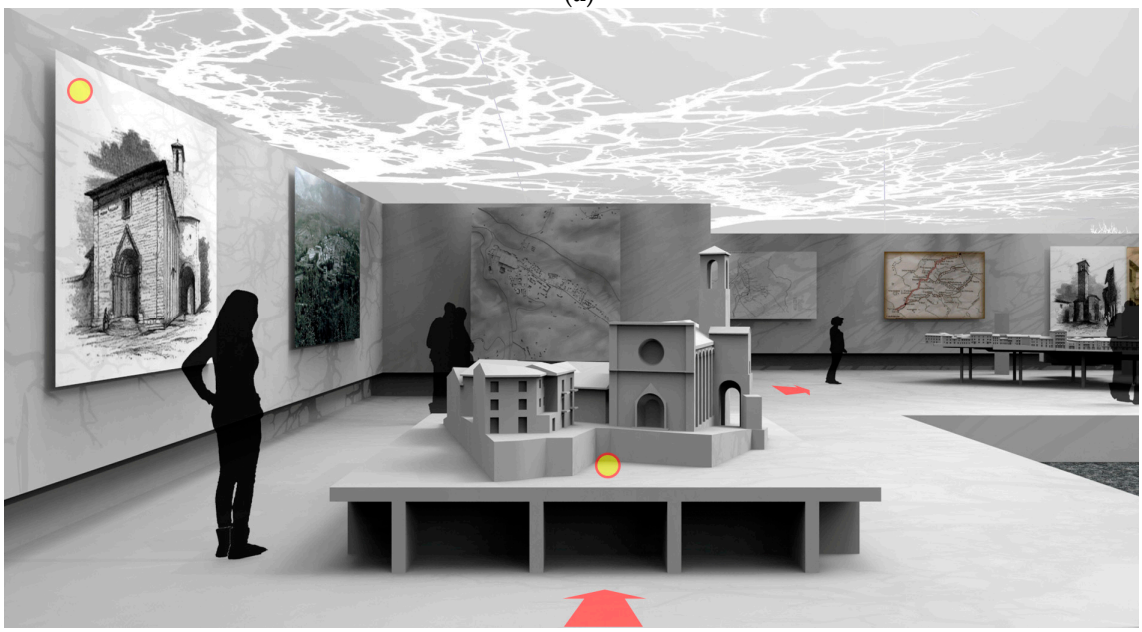


(**b**)

Figure 3. (**a**) The virtual museum model proposes a cross-shaped plan repeated in sequence, creating an ideally infinite space; (**b**) Movement within the MUVAT occurs through arrow interaction. Virtual content browsing is done by clicking hotspots.

One aspect deemed essential to the project was its usability. By usability we mean the user's ease of accessing the content. Every ICT tool expects a more or less strong degree of learning from the user as use progresses, which interferes with the scope of the museum, pushing away users. Therefore, an already common means of navigation was chosen. The digital space realistically simulates the real space, enclosing it in a sequence of spherical panoramas connected together that can be visited progressively according to a sequence of position-points identified along the path (Figure 3b). The user has likely already experimented with this method of investigating the space in Google Street View.

The form of the room and the architectural limitations proposed allow the informational system to set up only those parts of the room that are visible from the user's position (Figure 4).

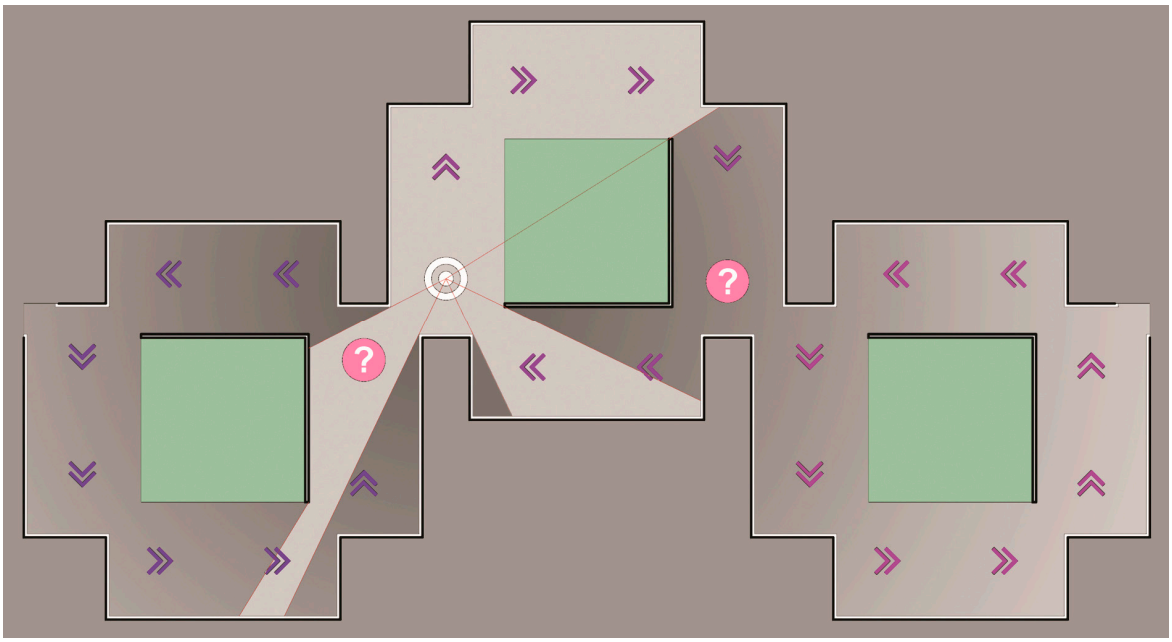
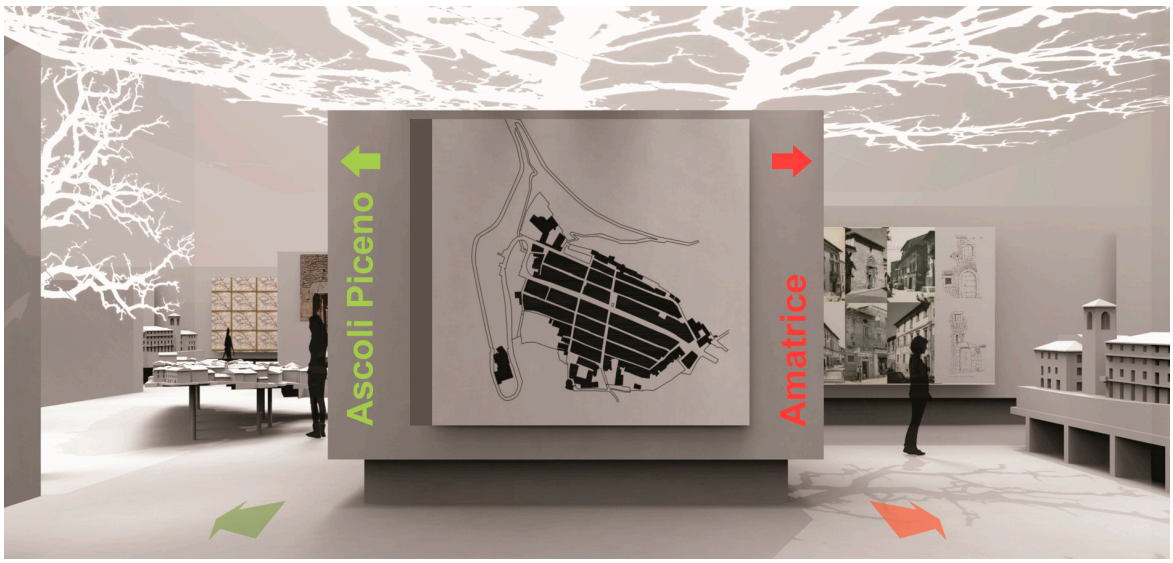


Figure 4. The scenography of the rooms is arranged in such a way as to limit the visitor's visibility (white dot in the image). This allows to load only part of the works in the room, those contained in the visual cone.

If we follow the museum visit starting from the entrance, we note that only part of the large room is available to view; the room is partly limited by the presence of the panels of the patio. Only after having seen a certain number of panoramas can I glimpse the wall that signals the choice of a new narration recognizable by the new expository material (Figure 5a). The partial limitation of the visual space allows the system to randomly load the information relative to the new narrations.

We can therefore assume that the curators, through a synthetic distribution scheme, will equip the spaces and walls of the rooms with various types of material (photographs, films, 3D models, texts, etc.). The number of rooms set up by each curator will vary as a function of the amount of material displayed (Figure 5b).

Once the user chooses which narration to follow, the informational system makes the first room available following the indications of the curator; during the visit, the subsequent room is set up in a random way. Hot spots indicate the sensible areas that can be activated. Through them, we have new forms of information: textual and photographic communications, films and music clips, navigable 3D models, gigapixel pyramid representation, and still other applications in augmented reality.



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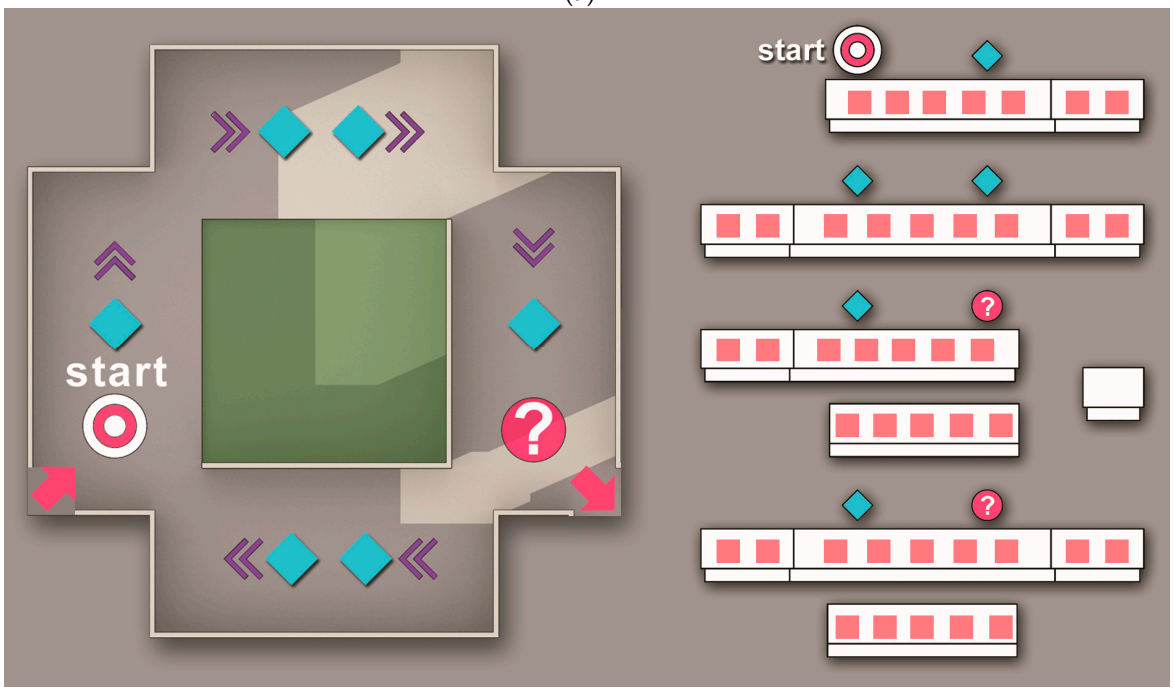

(**b**)

Figure 5. (**a**) The moment when you choose whether to continue the narration chosen or move to a new narration; (**b**) Interface dedicated to the curator. To the left, the plan view in which set up the 3D elements. To the right, the development of the interior elevations where you set up the two-dimensional elements.

The experimentation presented in the department's prior research activities have a place here, integrated in the general structure and arousing curiosity in the interaction with the information.

So that the communication is effectively bidirectional, it is necessary for the user to be emotionally involved in the museum space. With a desire to maintain the particularity of an ideal virtually realized space, it was characterized through the introduction of natural elements that build an empathetic relationship with the user.

Trees are placed in the patio and branches are situated above; despite their synthetic representation, they produce shadows on the floor and walls of the rooms, suggesting the placement of the museum in a wider, natural space. Outlines of users that move in the museum space serve to construct further emotional involvement in addition to providing an indispensable tool of perceptual

measurement with which to measure virtual satisfaction. With this appearance, users feel like they are part of a shared phenomenon (Figure 6)

The same user, by choosing the material viewed along the individual path of cultural learning, can propose a personal narration that participates together with the rest.

The MUVAT virtual museum project manages, through the active relationship with the user, to become a dynamic provider of information. It is always different and available to the integration of data and the changing interests of the subject participate actively, influencing the data.

Its supporting structure, which is simple and easy to approach, is enhanced with cultural and technological investigations that expand its communicational and informational capacity. The reciprocal interactions among the expert, exhibit, and community make the museum open to new personal relationships, and thus to new transformations.

Figure 6. Part of an equi-retangular image for the representation of MUVAT space. The immersive experience is made possible by the use of spherical views.

Author Contributions: Michele Calvano is dealt with the methodological aspects for the construction of the models used in the project: model of the landscape, model of the city and the architecture of the museum. He is also involved in the creation of spherical panoramas and the connections between these and the multimedia contents for obtaining immersive experience. Andrea Casale and Elena Ippoliti are the creator of the Muvat project and took care of the programmatic aspects. They have been involved in the contextualization of the project within the disciplinary scientific sector.

Conflicts of Interest: The authors declare no conflict of interest.

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